

WHAT IS CLAIMED IS:

1. A method of assaying cellular activity by monitoring a change in a cellular system, comprising:
 - coupling an electromagnetic test signal in a frequency range from 10 MHz to 1000 GHz to a sample in which a cellular event is being detected, whereby said sample interacts with and modulates said test signal to produce a modulated test signal;
 - detecting said modulated test signal; and
 - analyzing said modulated test signal to detect said cellular event.
2. The method of claim 1, wherein said cellular activity comprises a change in amount of a substance present in said cell as the result of presence of a test substance in a medium containing said cell.
3. The method of claim 1, wherein said substance is a protein, a lipid, a carbohydrate, a nucleic acid, water, or an ion.
4. The method of claim 1, wherein said cell comprises artificially inserted genetic material encoding a target receptor.
5. The method of claim 1, wherein said cell is a wild-type cell.
6. The method of claim 2, wherein said cell comprises a receptor having a known activity and said change results from activity of said test substance as an agonist or antagonist of said receptor activity.
7. The method of claim 1, wherein said change is opening or closing of an ion channel.
8. The method of claim 1, wherein said cell is a mammalian cell.

9. The method of claim 8, wherein said cell is a CHO cell.
10. The method of claim 1, further comprising verifying said method by correlating with a known cell activity of a known substance prior to testing an unknown substance.
11. A method of assaying cellular activity by monitoring a change in a cellular system, comprising:
- coupling an electromagnetic test signal to a sample in which a cellular event is being detected, whereby said sample interacts with and modulates said test signal to produce a modulated test signal;
 - detecting said modulated test signal; and
 - analyzing said modulated test signal to detect said cellular event,
- whereby said sample is coupled to said signal by a one-port coplanar waveguide transmission line operable to support the propagation of a electromagnetic test signal, comprising:
- a signal line configured to conduct a time-varying voltage therealong; and
 - one or more ground elements configured to maintain a time-invariant voltage therealong, the one or more ground elements spaced apart from the signal line and located generally within the same plane as the signal line, wherein a detection region is formed between a portion of the signal line and a portion of at least one of the one or more ground elements; and
- whereby said sample is contained in a sample containment structure intersecting the detection region of the one-port coplanar waveguide transmission line, wherein the sample containment structure comprises a cavity operable to hold 1 ml or less of sample solution within the detection region.
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12. The method of claim 11, wherein said cellular activity comprises a change in amount of a substance present in said cell as the result of presence of a test substance in a medium containing said cell.

13. The method of claim 11, wherein said substance is a protein, a lipid, a carbohydrate, a nucleic acid, water, or an ion.
14. The method of claim 11, wherein said cell comprises artificially inserted genetic material encoding a target receptor.
15. The method of claim 11, wherein said cell is a wild-type cell.
16. The method of claim 12, wherein said cell comprises a receptor having a known activity and said change results from activity of said test substance as an agonist or antagonist of said receptor activity.
17. The method of claim 11, wherein said change is opening or closing of an ion channel.
18. The method of claim 11, wherein said cell is a mammalian cell.
19. The method of claim 18, wherein said cell is a CHO cell.
20. The method of claim 11, further comprising verifying said method by correlating with a known cell activity of a known substance prior to testing an unknown substance.